HMT-West 2011: IOP2 Summary

- Operations director: Dave Kingsmill
- Duration
  - Start: 18 UTC 17 December 2010
  - End: 04 UTC 20 December 2010
- Activities at Lincoln (LHM) field site
  - Skywater Doppler radar operated from 18 UTC 17 Dec to 04 UTC 20 Dec. No data disruptions were encountered
  - A total of 17 GPS balloon soundings were released at the following times:
    - 17 Dec (18 UTC), 18 Dec (00, 04, 08, 12, 16, 20 UTC), 19 Dec (00, 04, 08, 12, 16[twice due to failure], 20 UTC[twice due to failure], 20 Dec (00, 04 UTC)
- NWS rawinsonde activities
  - Oakland and Reno supplemental soundings were released at 06 UTC and 18 UTC on both 18 and 19 December (i.e., a total of 4 supplemental soundings at both sites).

HMT-West 2011: IOP2 Summary

- Autonomous instrument operation problems
  - Blue Canyon: Surface meteorology tower was blown over during the latter portion of the IOP (~00 UTC 20 Dec); data from the site after this time should be viewed with caution.
  - Norden: Power outage at the site stopped collection of Parsivel disdrometer and Hotplate precipitation gauge data starting around 19 UTC 19 Dec through the end of the IOP.
  - Sugar Pine Dam: Intermittent power outages at the site disrupted collection of S-band precipitation profiler and Parsivel disdrometer data starting around 16 UTC 19 Dec through the end of the IOP.

HMT-West 2011: IOP2 Summary

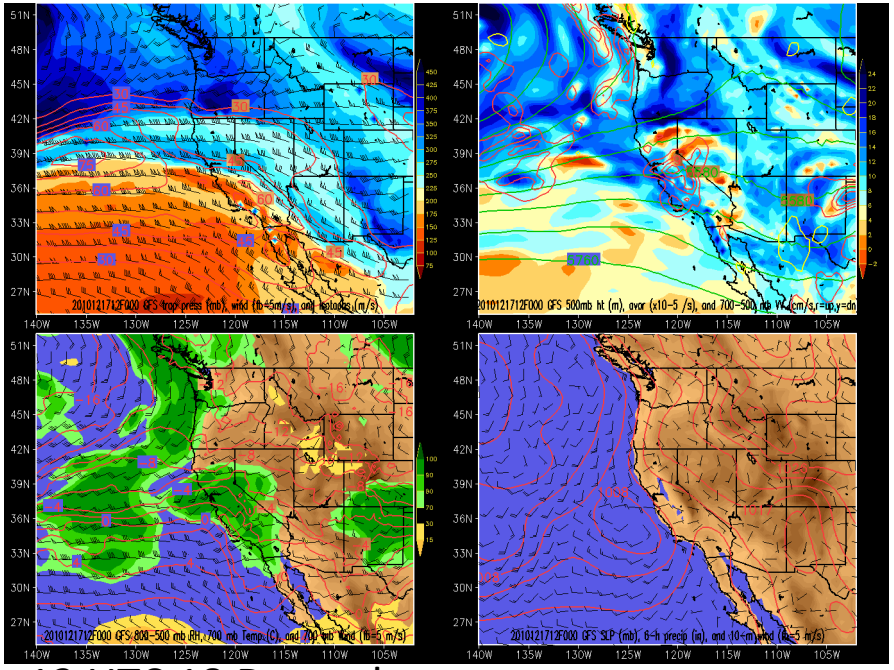
- Overview

This 58 hour IOP was associated with an atmospheric river (AR) that had its origins just north of Hawaii in a plume of very moist air that had been pushed northward from near the equator. The AR was focused on central and southern California during most of the event, with peak IWV values of > 4 cm just off of Pt. Conception. However, two different waves developed on the frontal zone, one during the early part of 18 Dec and the other during the middle part of 19 Dec. These waves displaced the AR slightly northward, allowing stronger SSW winds to advect higher-valued IWV (~3 cm) into northern California during these periods, which resulted in the development of widespread precipitation along the northern Sierra and the adjacent central valley. Barrier jets were evident along the Sierra during both frontal wave episodes. There was not an obvious frontal passage associated with the first period of widespread precipitation, but the second period of widespread precipitation was followed by a distinct narrow-cold-frontal rainband (NCFR). Sierra snow levels for the IOP started at ~4 kft early on 17 Dec but rose to ~7.5 kft late on 17 Dec. The snow levels fluctuated between 5.5 and 7.5 kft on 18-19 December before descending to ~4 kft after NCFR passage around 00 UTC 20 Dec. Precipitation accumulations for the IOP were 7” to 9” in the Sierra and 2” to 4” in the Sacramento valley.

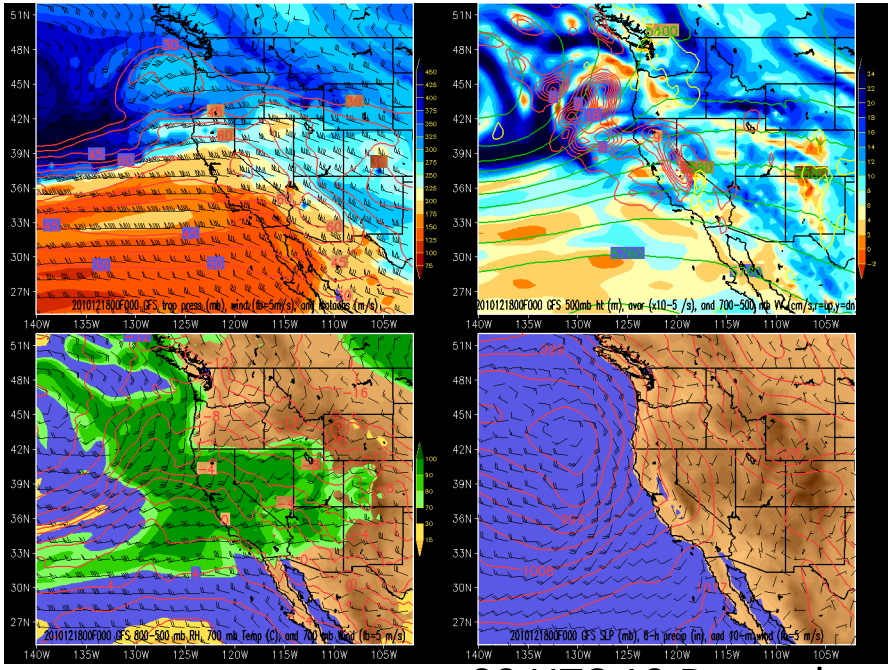
The images in the following slides provide additional context for the IOP

Synoptic Evolution

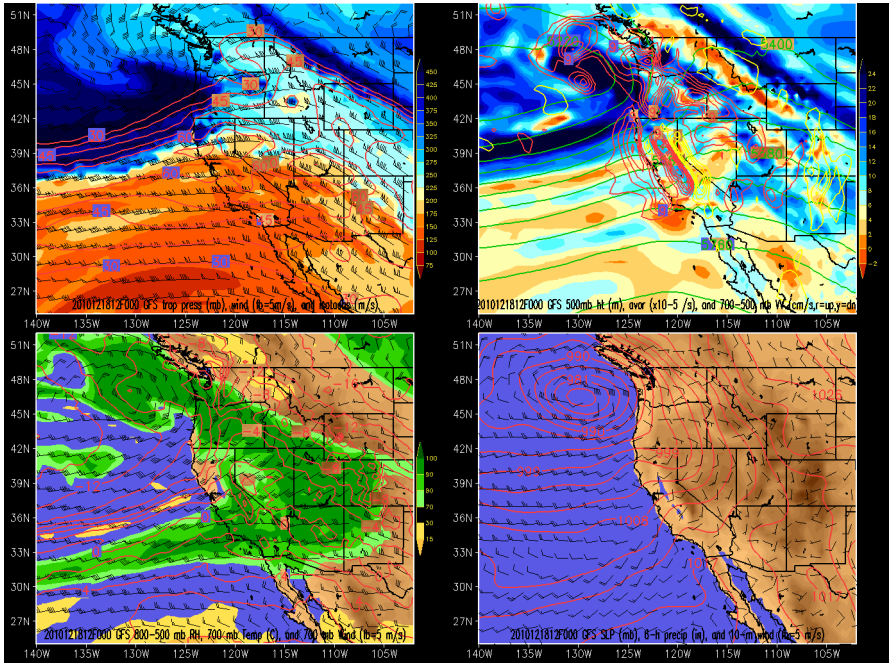
12 UTC 17 December



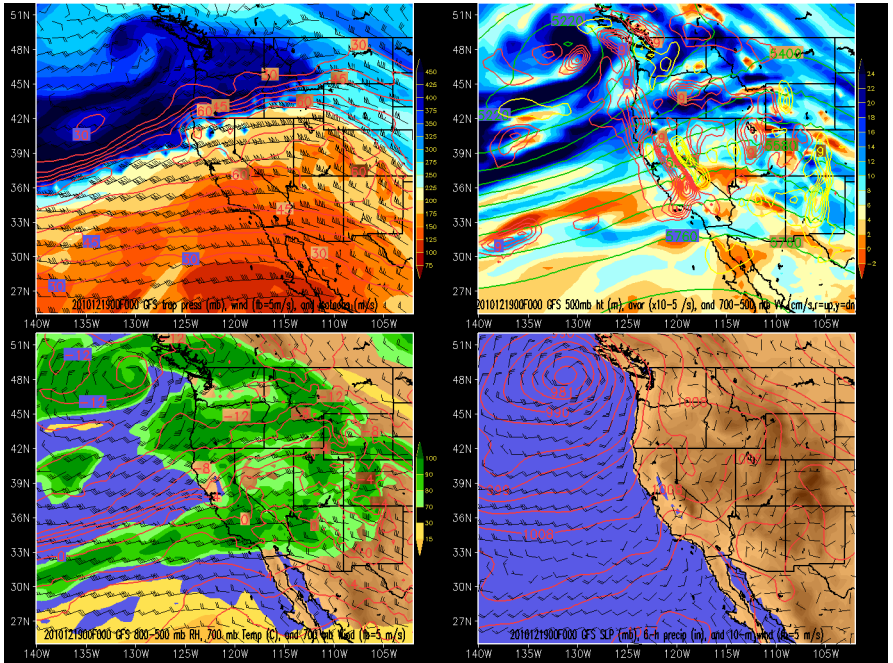
00 UTC 18 December



12 UTC 18 December

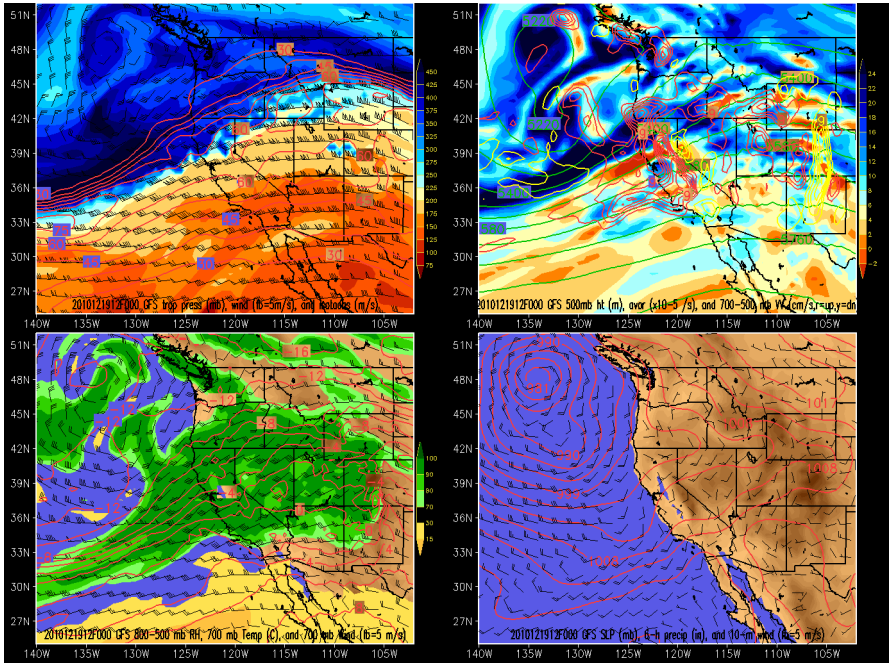


00 UTC 19 December

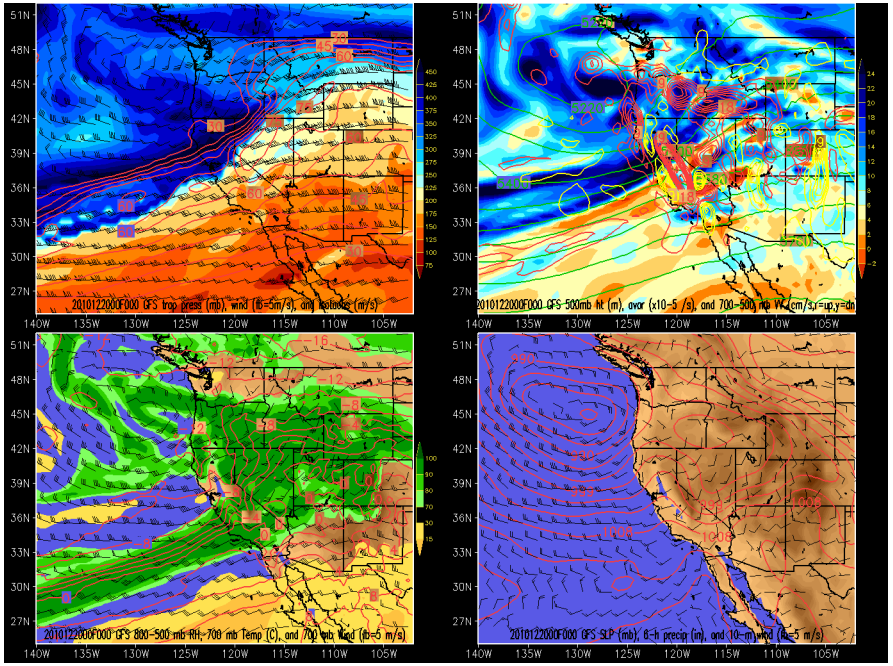


Synoptic Evolution

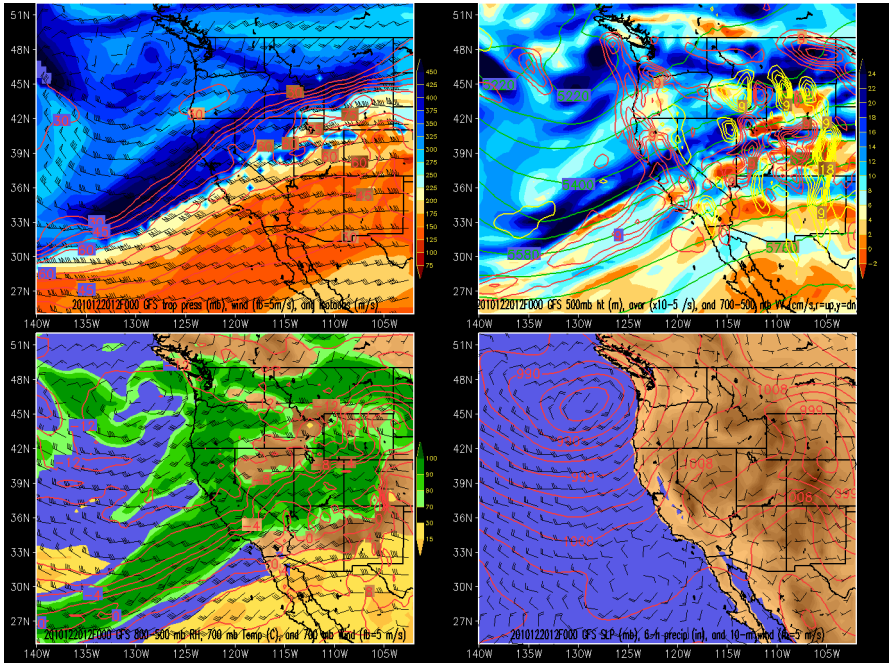
12 UTC 19 December



00 UTC 20 December

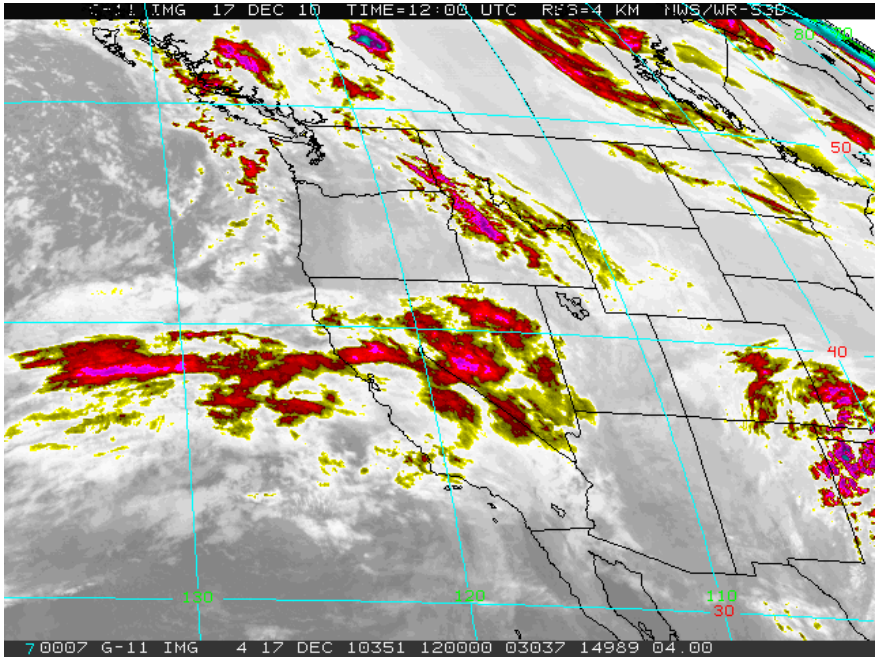


12 UTC 20 December

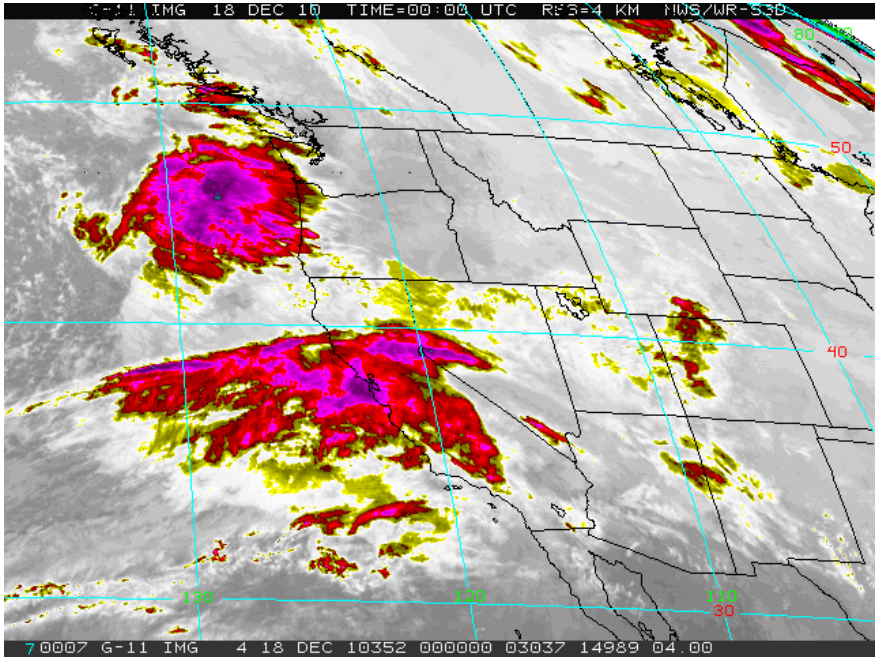


IR Satellite Evolution

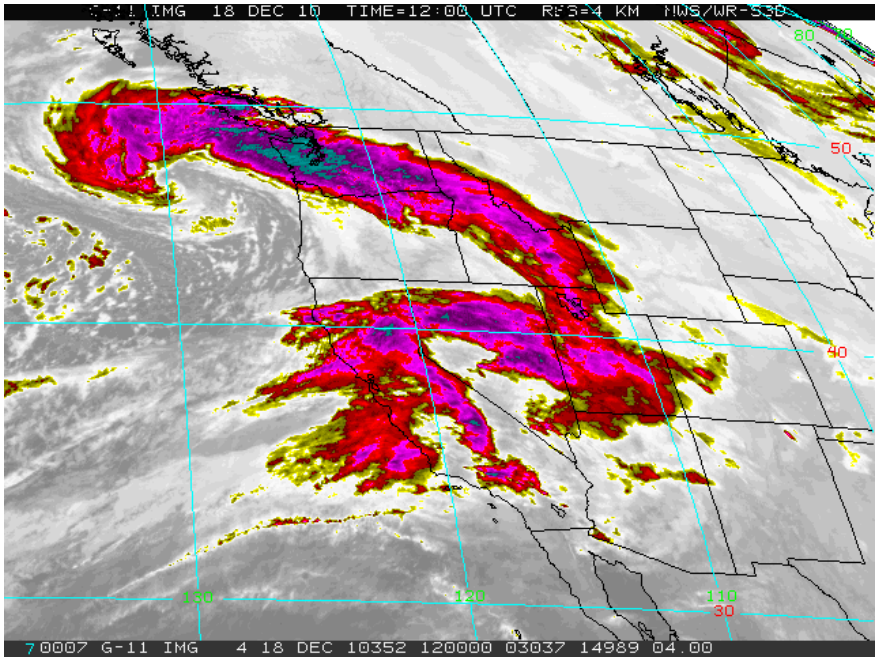
12 UTC 17 December



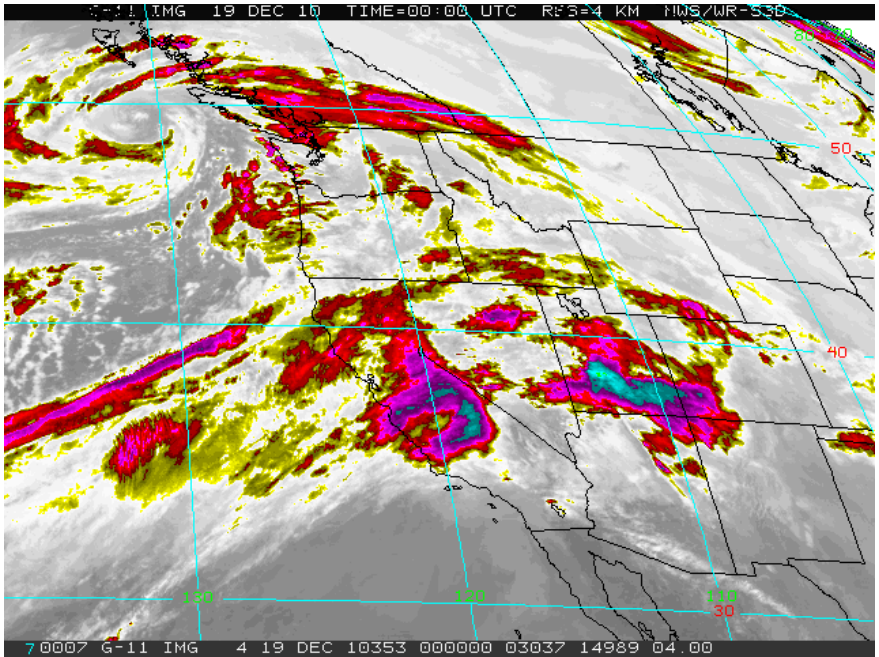
00 UTC 18 December



12 UTC 18 December

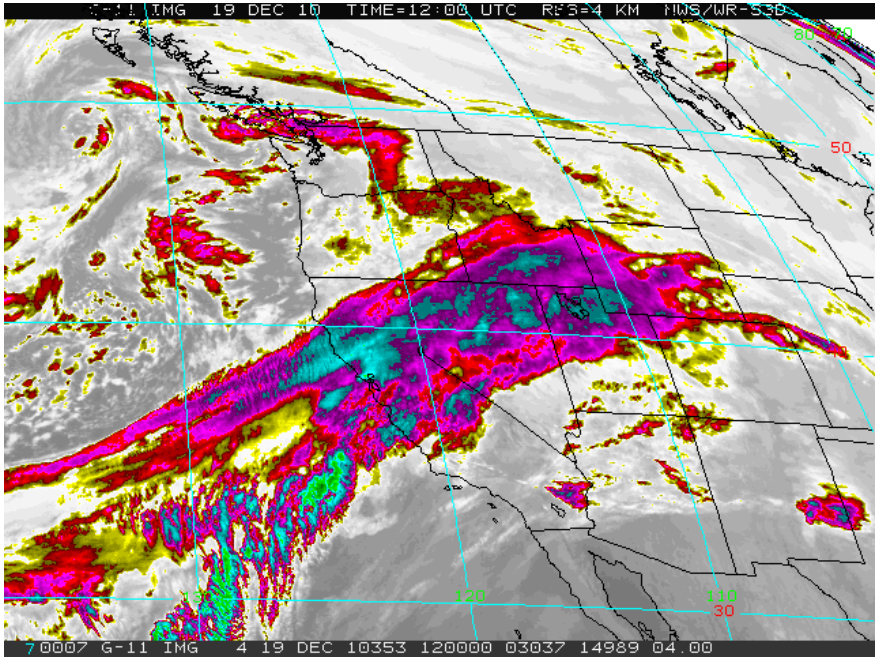


00 UTC 19 December

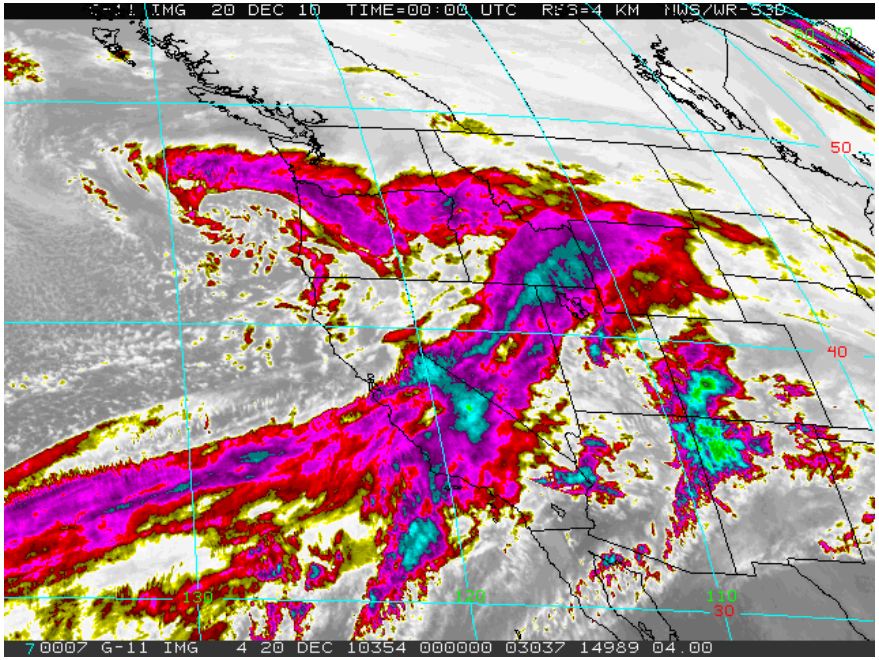


IR Satellite Evolution

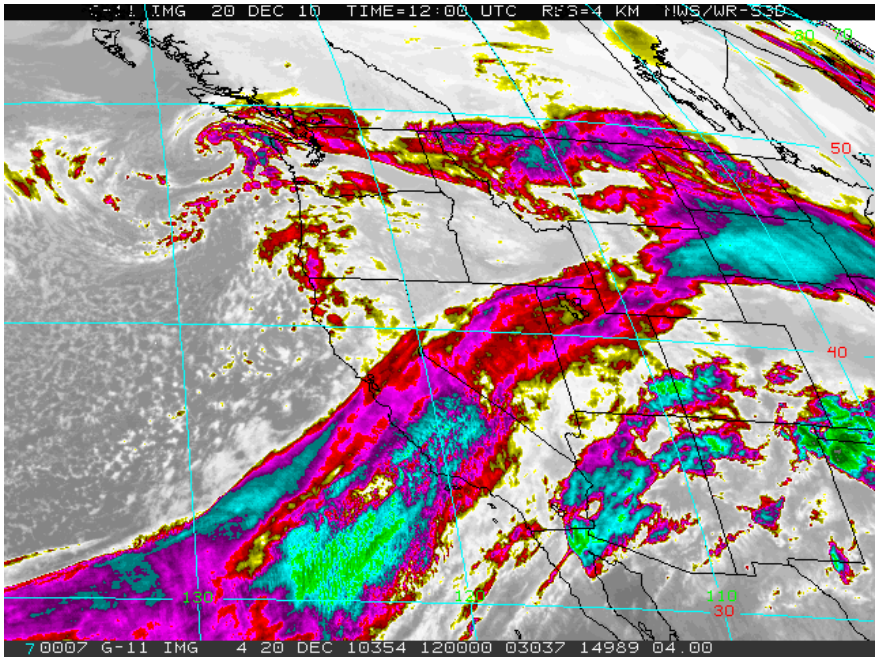
12 UTC 19 December



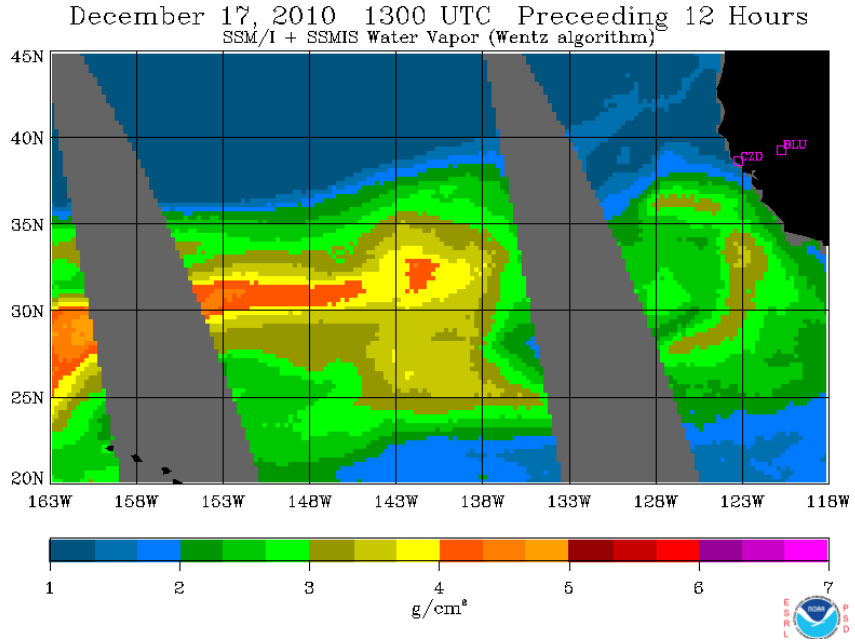
00 UTC 20 December

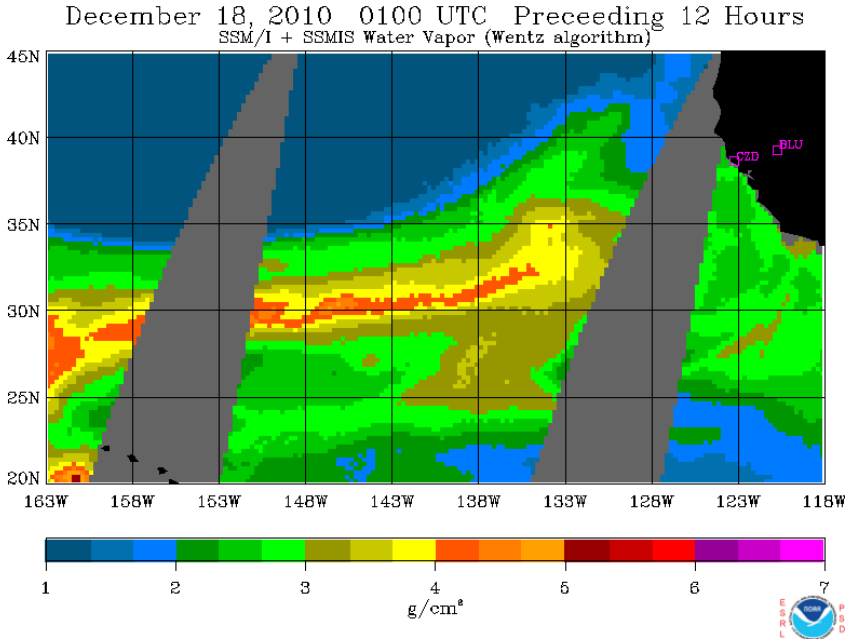


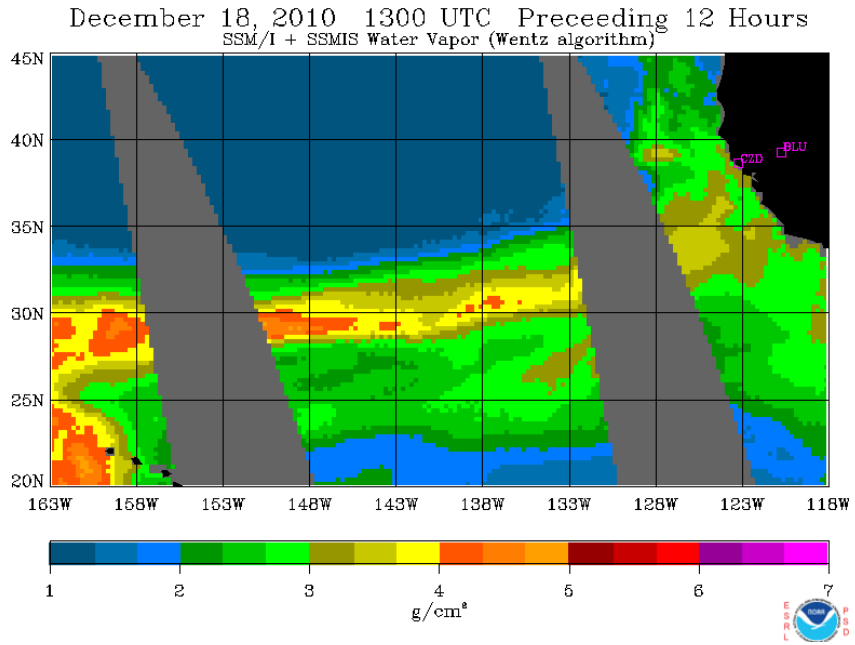
12 UTC 20 December

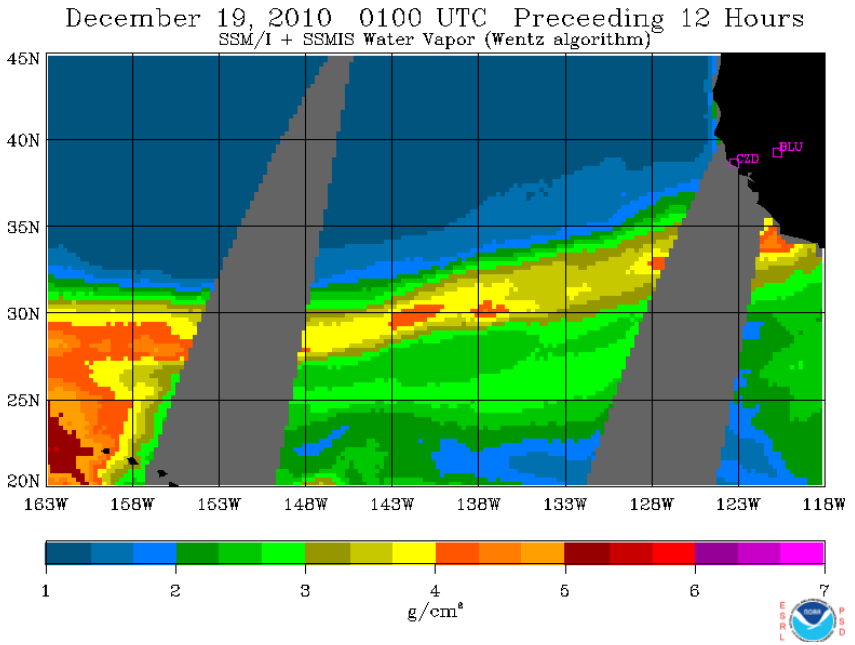


SSM/I Satellite IWV Evolution

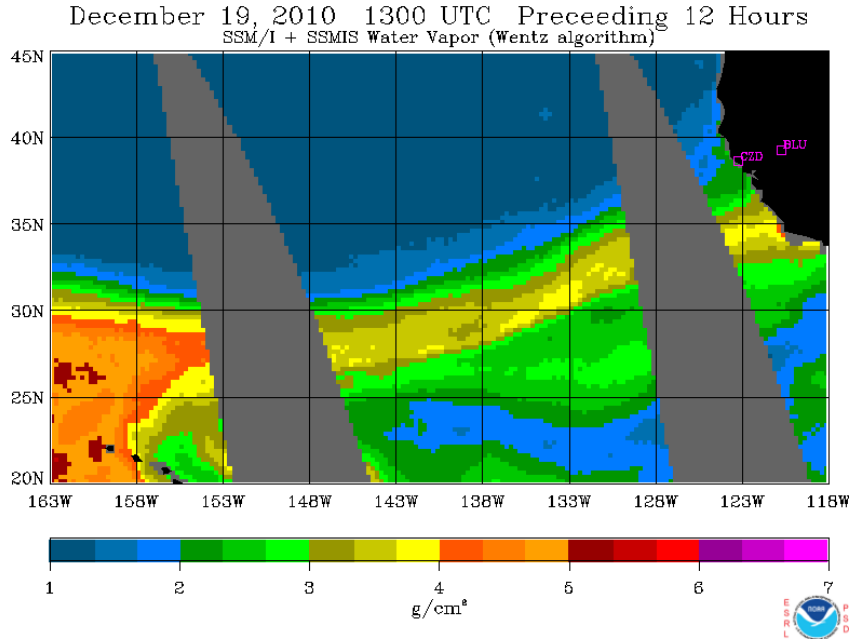


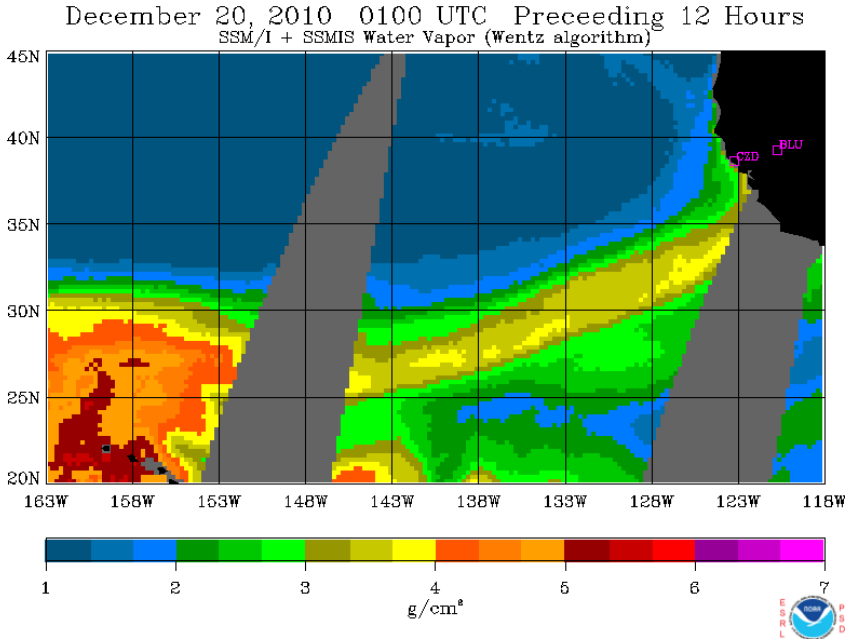


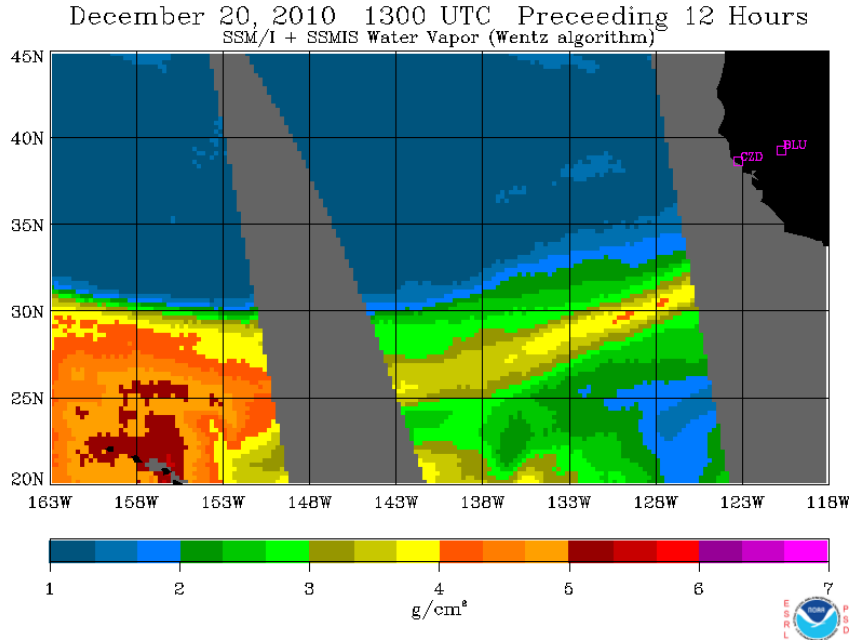




SSM/I Satellite IWV Evolution

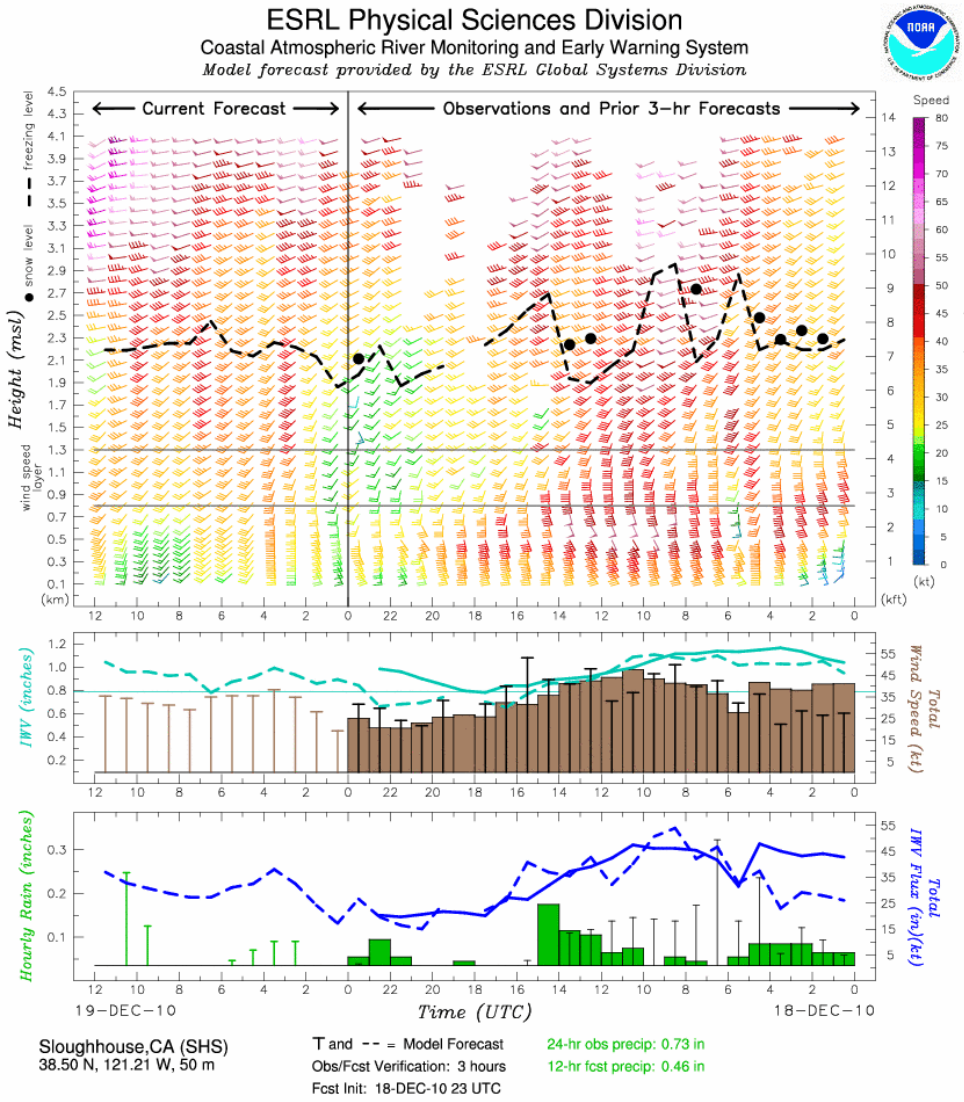






Winds and Water Vapor Flux @ Sloughhouse

18 December

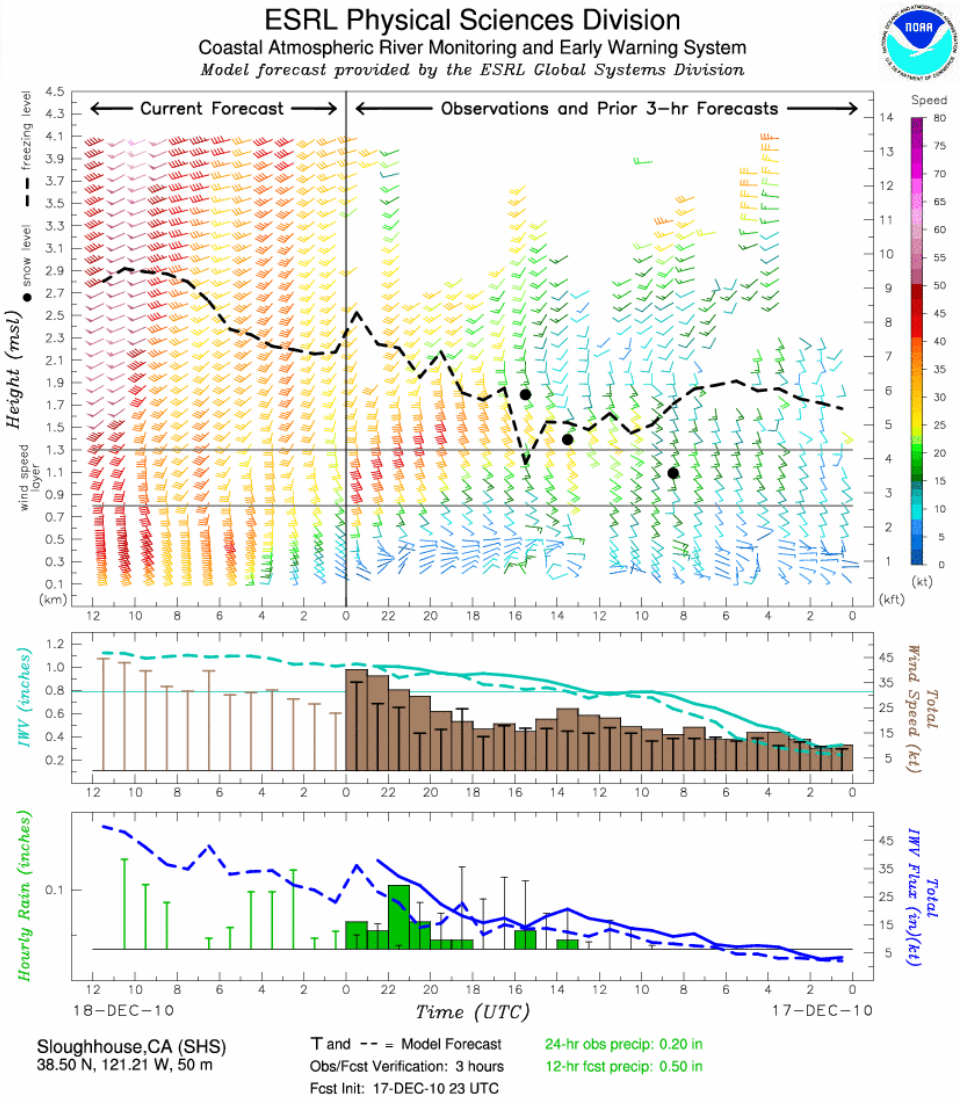


Sloughhouse,CA (SHS)
38.50 N, 121.21 W, 50 m

T and -- = Model Forecast
Obs/Fcst Verification: 3 hours
Fcst Init: 18-DEC-10 23 UTC

24-hr obs precip: 0.73 in
12-hr fcst precip: 0.46 in

17 December



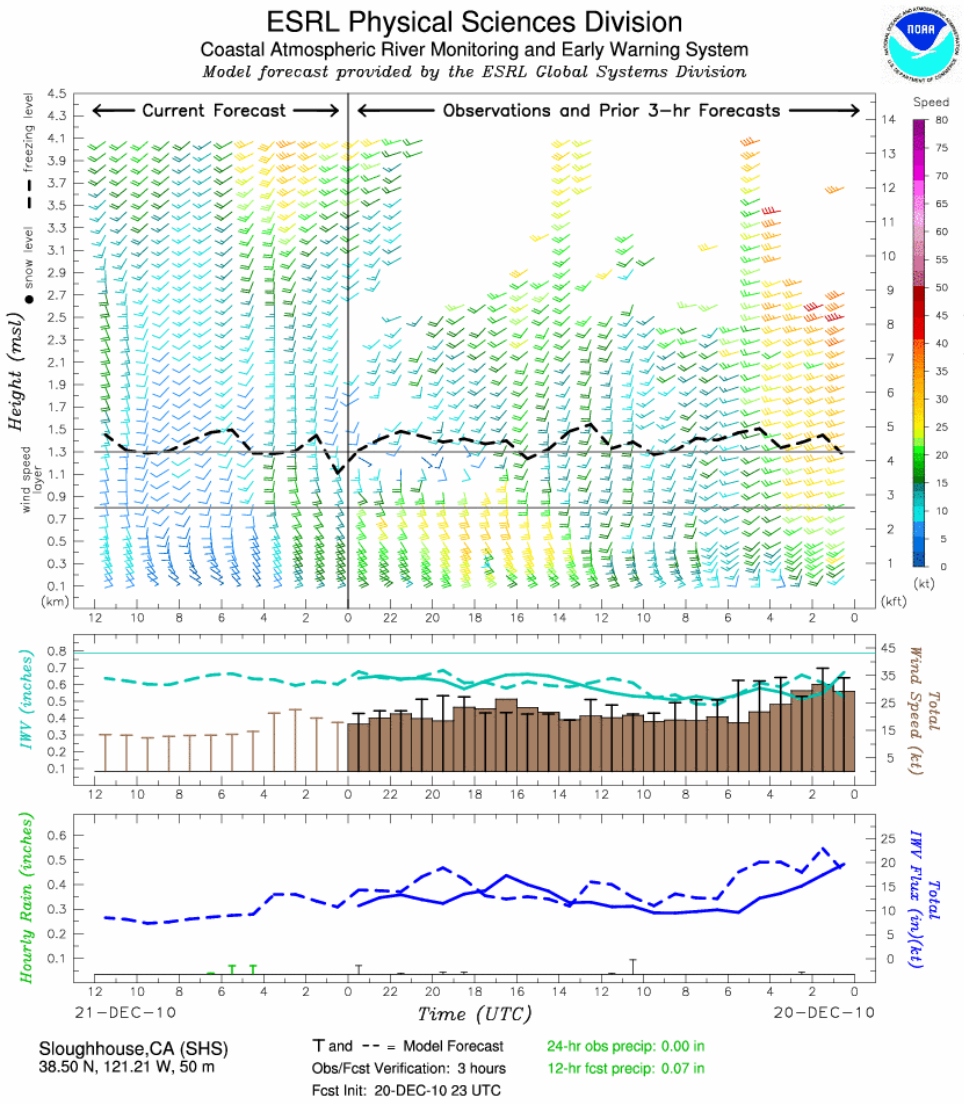
Sloughhouse,CA (SHS)
38.50 N, 121.21 W, 50 m

T and -- = Model Forecast
Obs/Fcst Verification: 3 hours
Fcst Init: 17-DEC-10 23 UTC

24-hr obs precip: 0.20 in
12-hr fcst precip: 0.50 in

Winds and Water Vapor Flux @ Sloughhouse

20 December

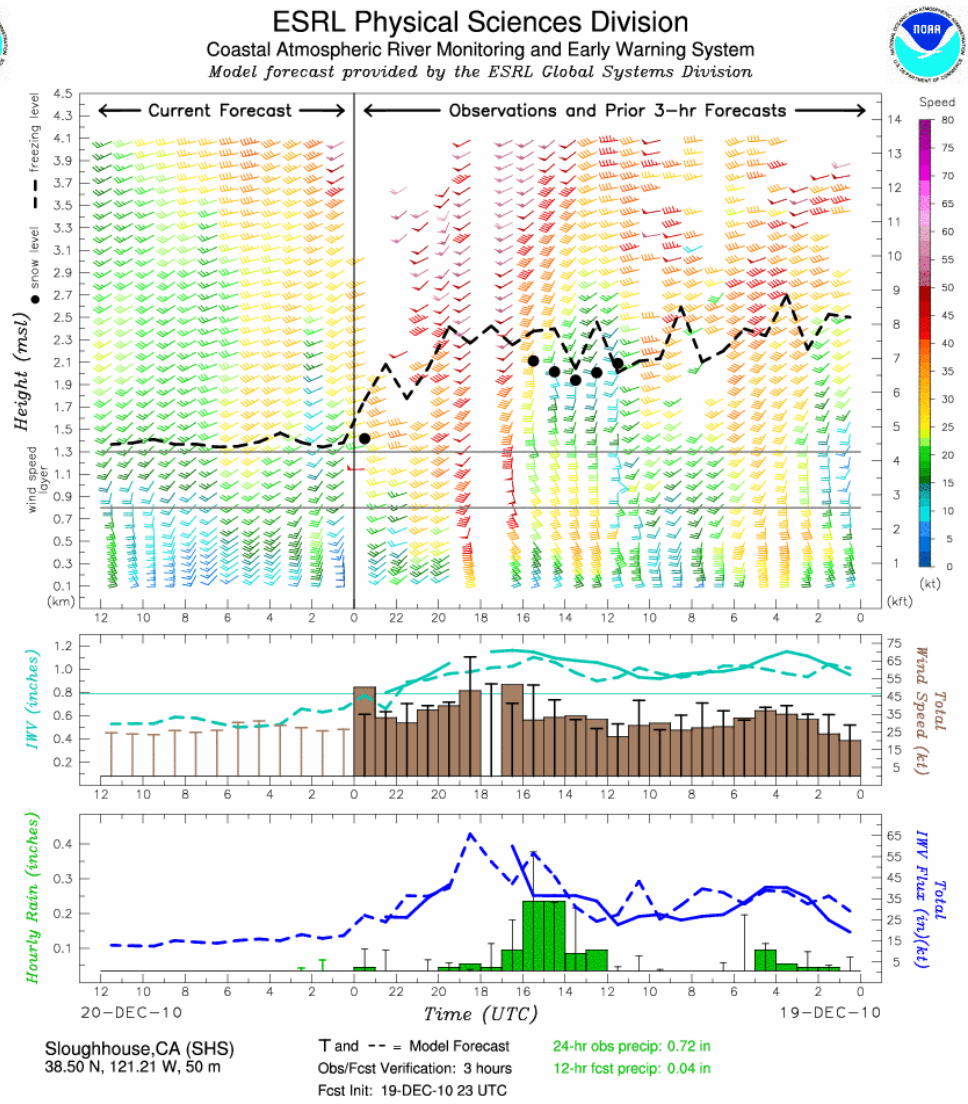


Sloughhouse,CA (SHS)
38.50 N, 121.21 W, 50 m

T and -- = Model Forecast
Obs/Fcst Verification: 3 hours
Fcst Init: 20-DEC-10 23 UTC

24-hr obs precip: 0.00 in
12-hr fcst precip: 0.07 in

19 December

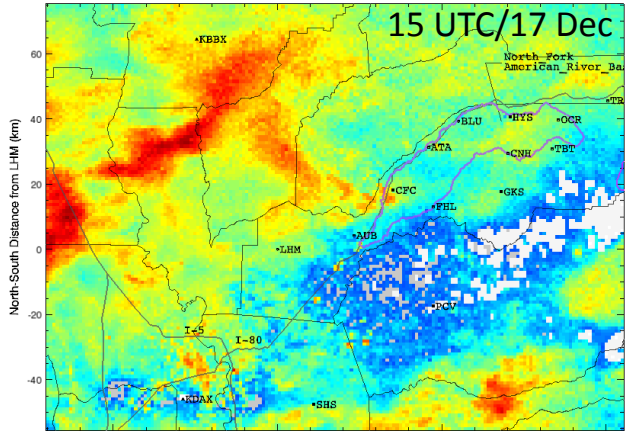


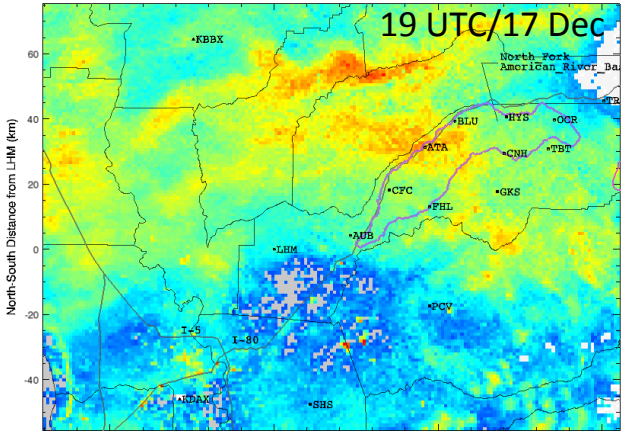
Sloughhouse,CA (SHS)
38.50 N, 121.21 W, 50 m

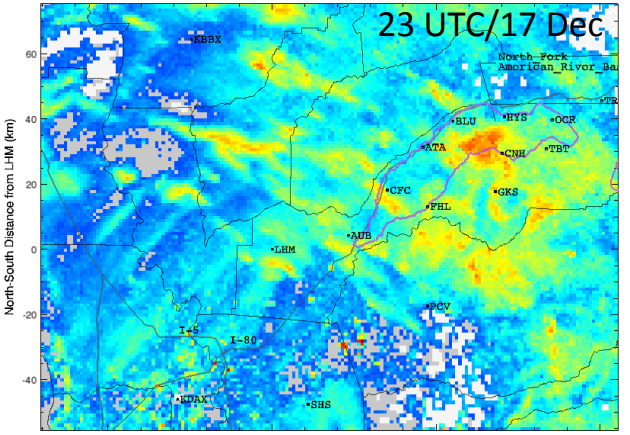
T and -- = Model Forecast
Obs/Fcst Verification: 3 hours
Fcst Init: 19-DEC-10 23 UTC

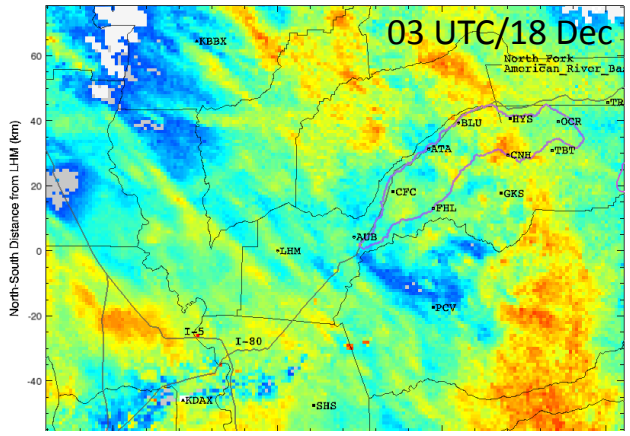
24-hr obs precip: 0.72 in
12-hr fcst precip: 0.04 in

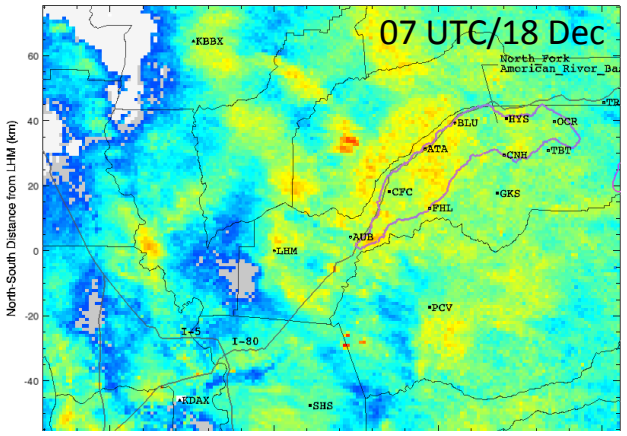
KDAX Radar Reflectivity Evolution

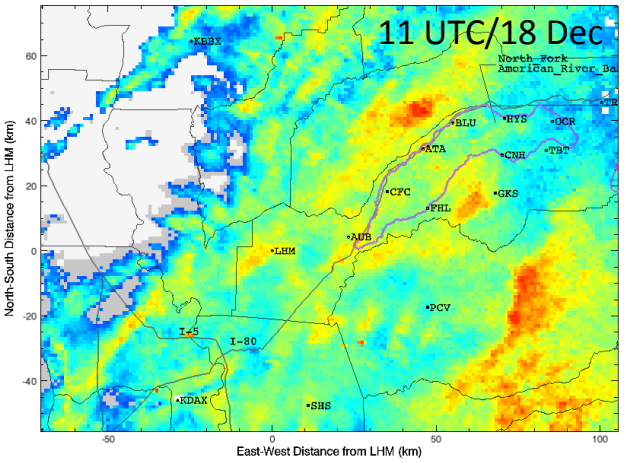


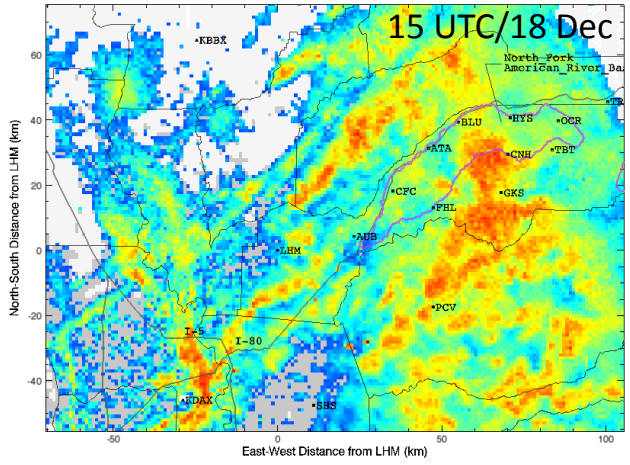


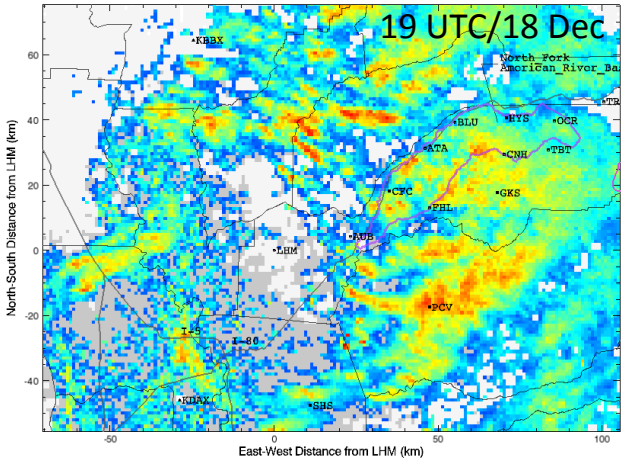


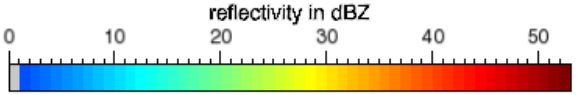




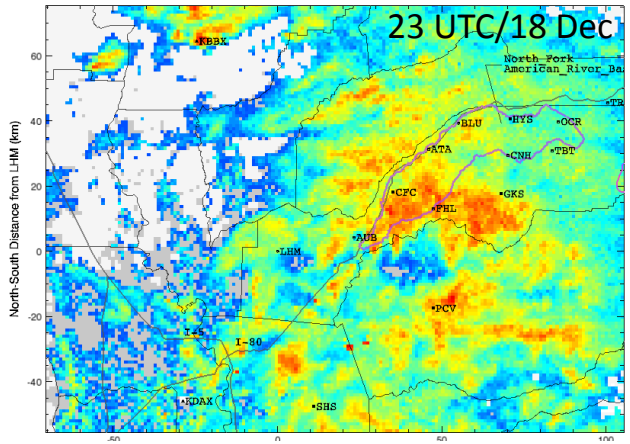


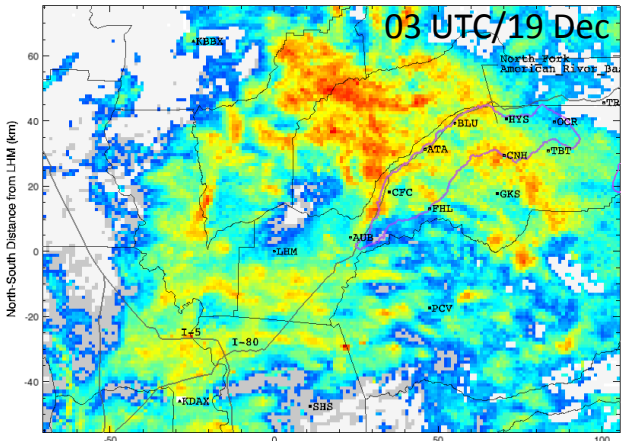


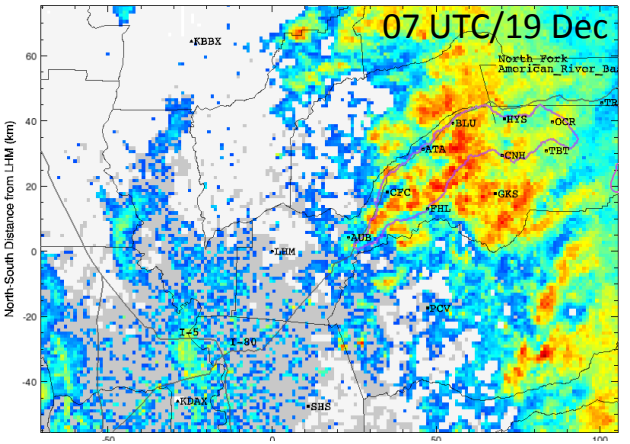


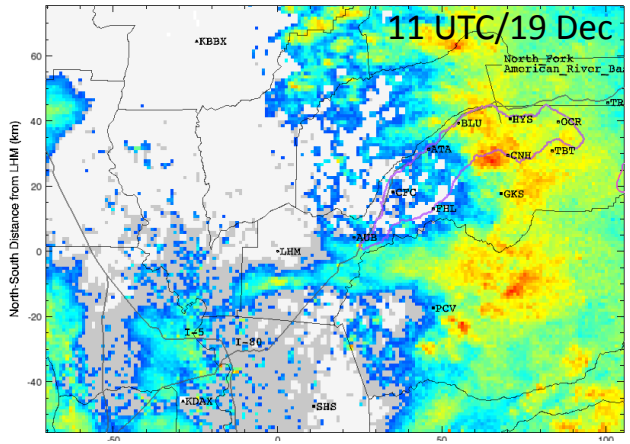


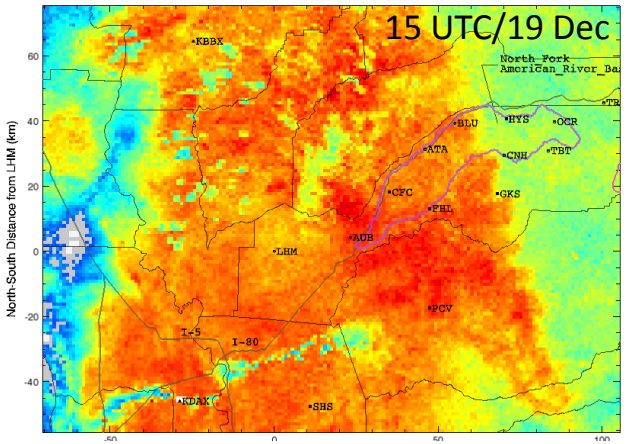
KDAX Radar Reflectivity Evolution

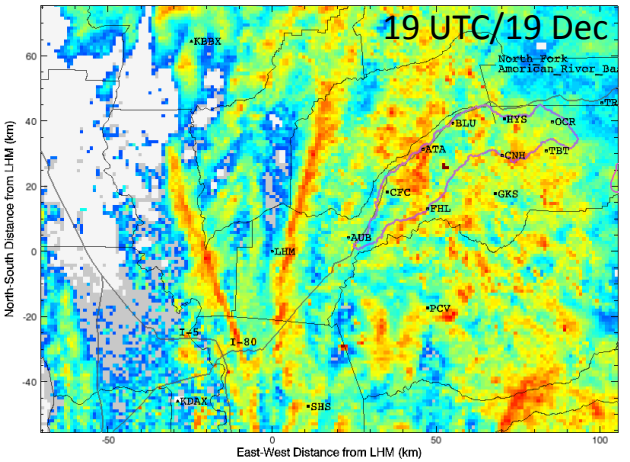


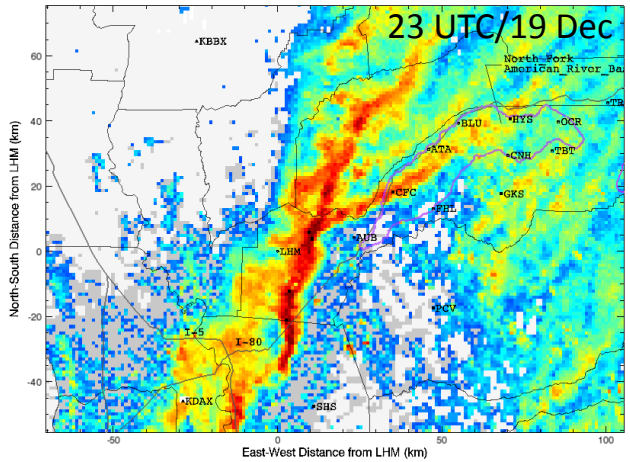


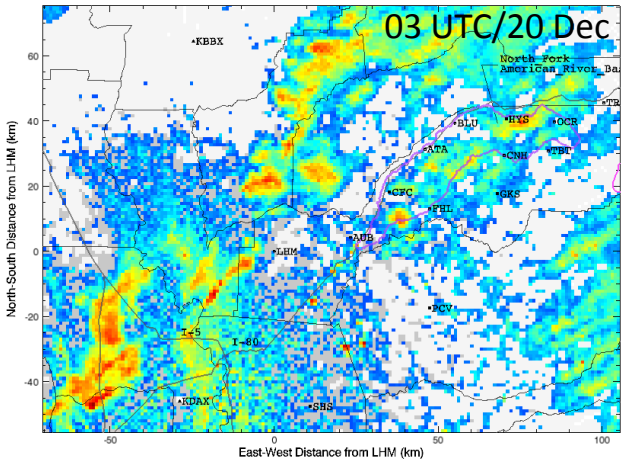


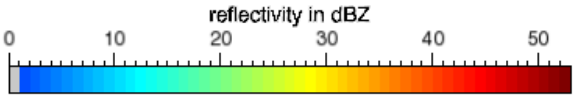










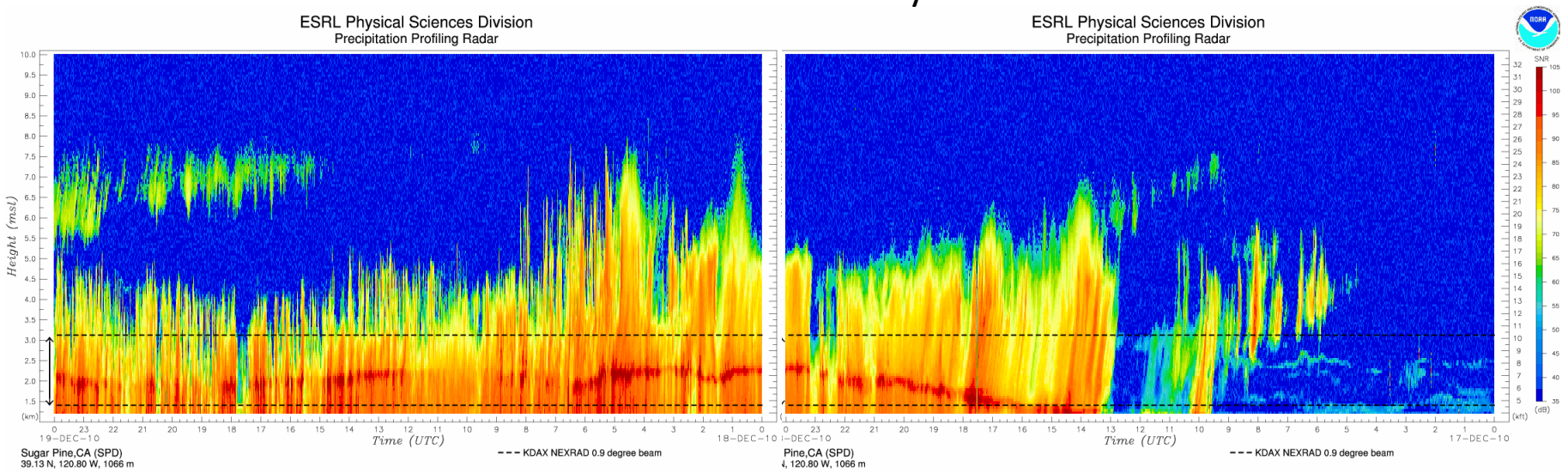


Vertical Precipitation Structure @ Sugar Pine

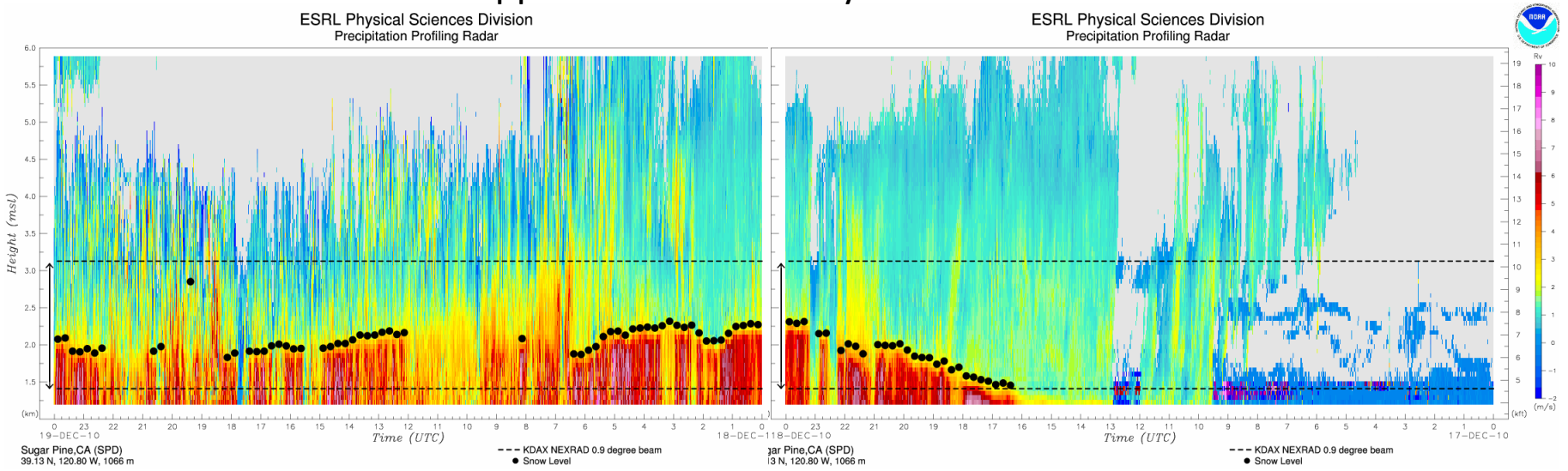
18 December

17 December

Radar Reflectivity



Doppler Vertical Velocity and Snow Level

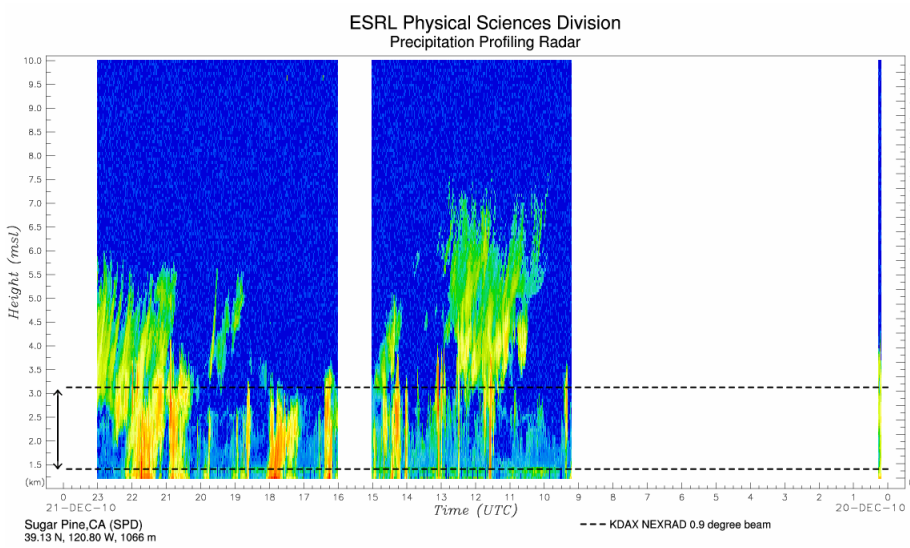


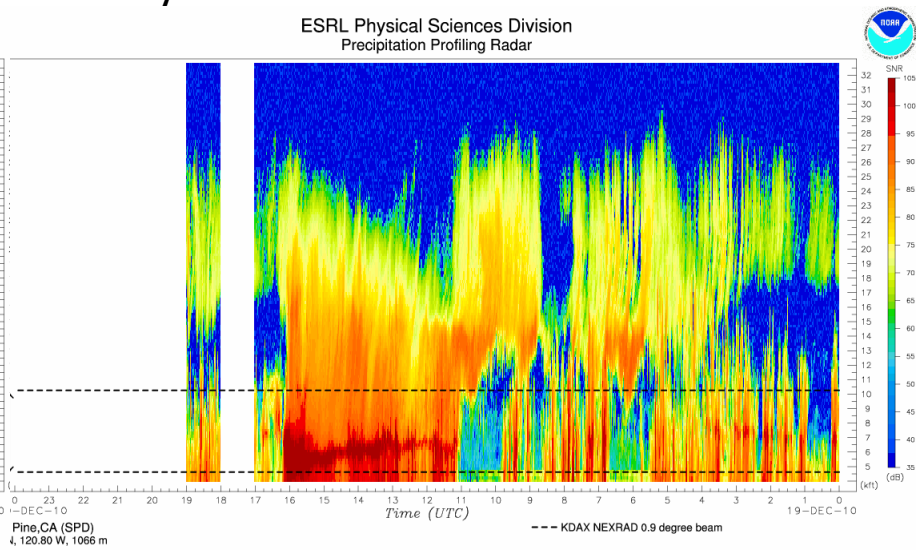
Vertical Precipitation Structure @ Sugar Pine

20 December

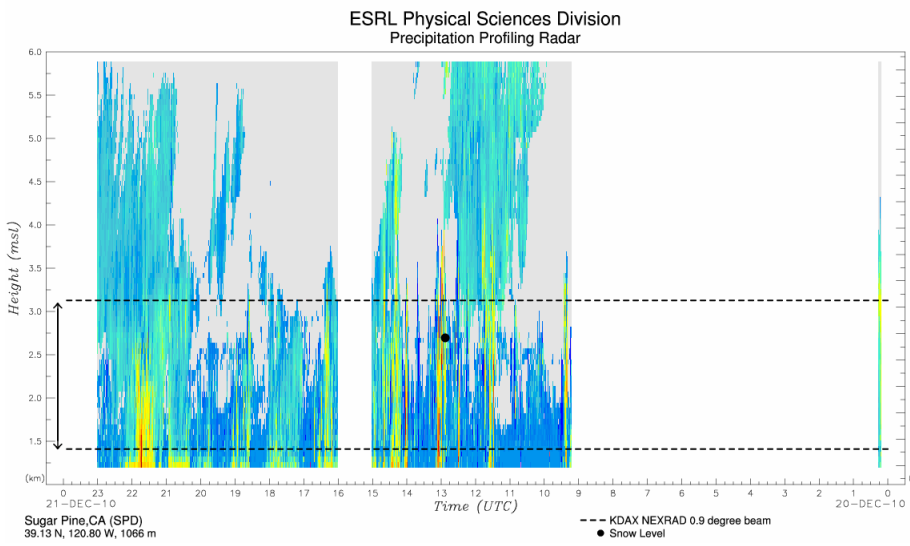
19 December

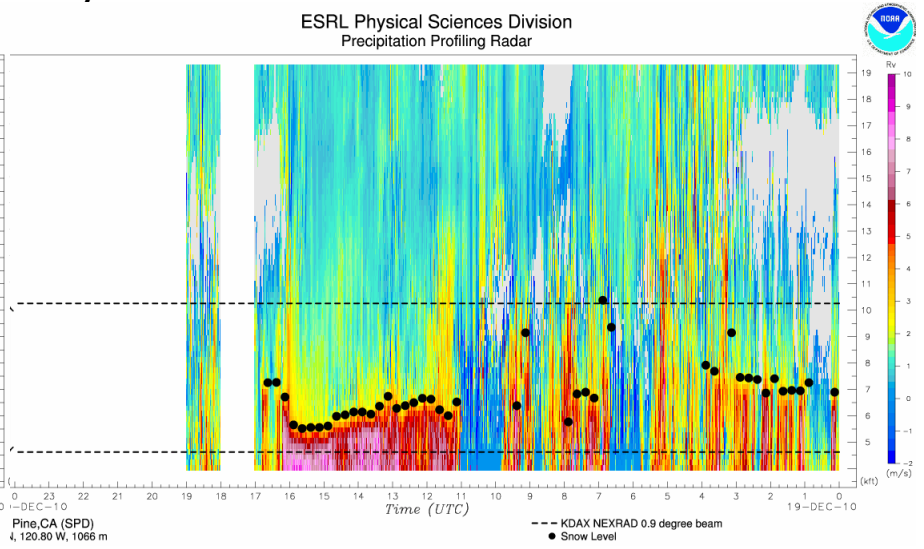
Radar Reflectivity





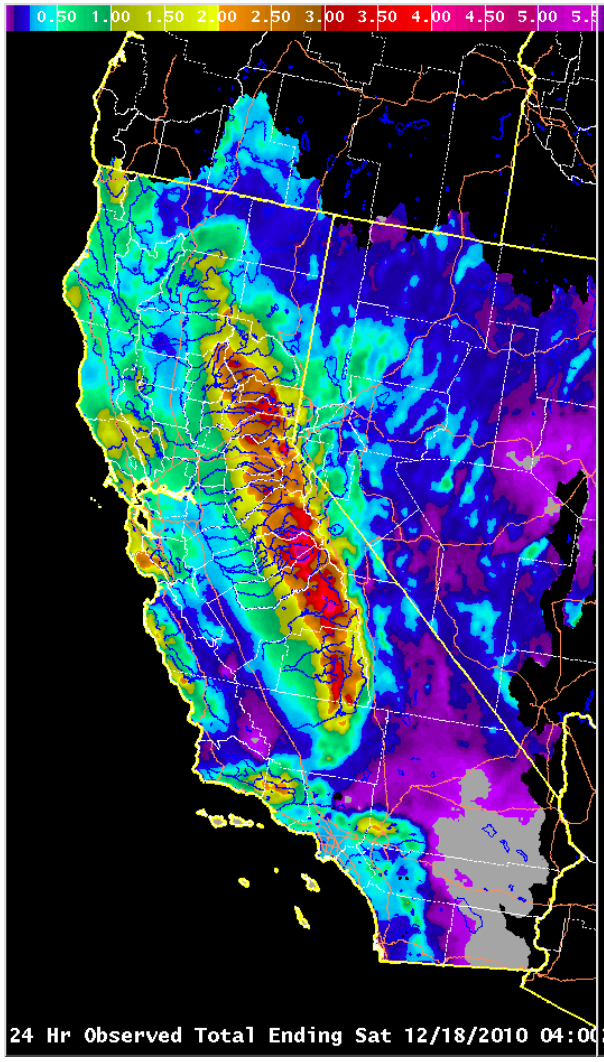
Doppler Vertical Velocity and Snow Level



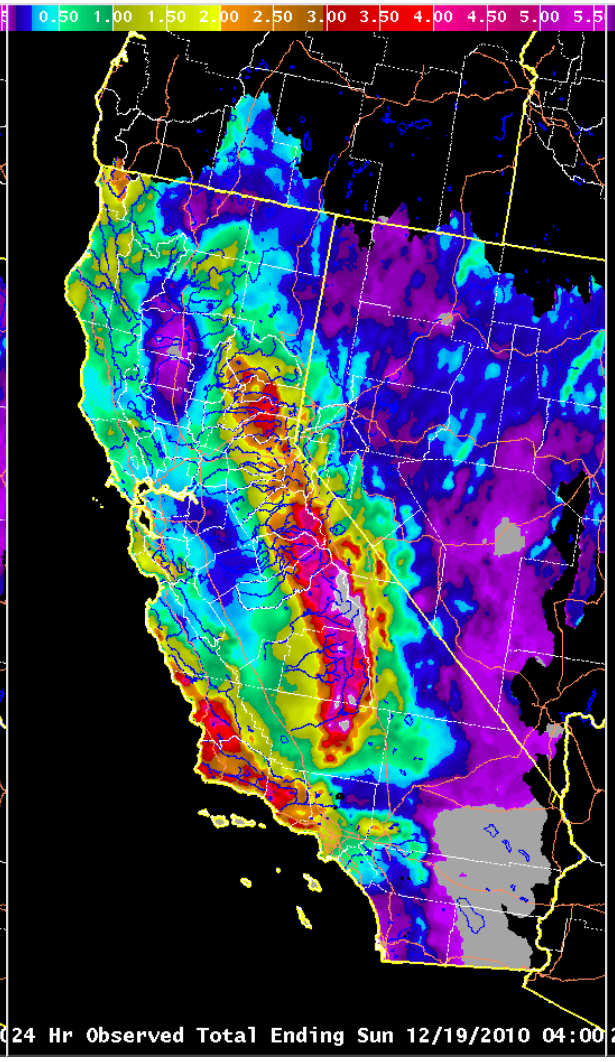


CNRFC Precipitation Gauge + Mtn. Mapper QPE

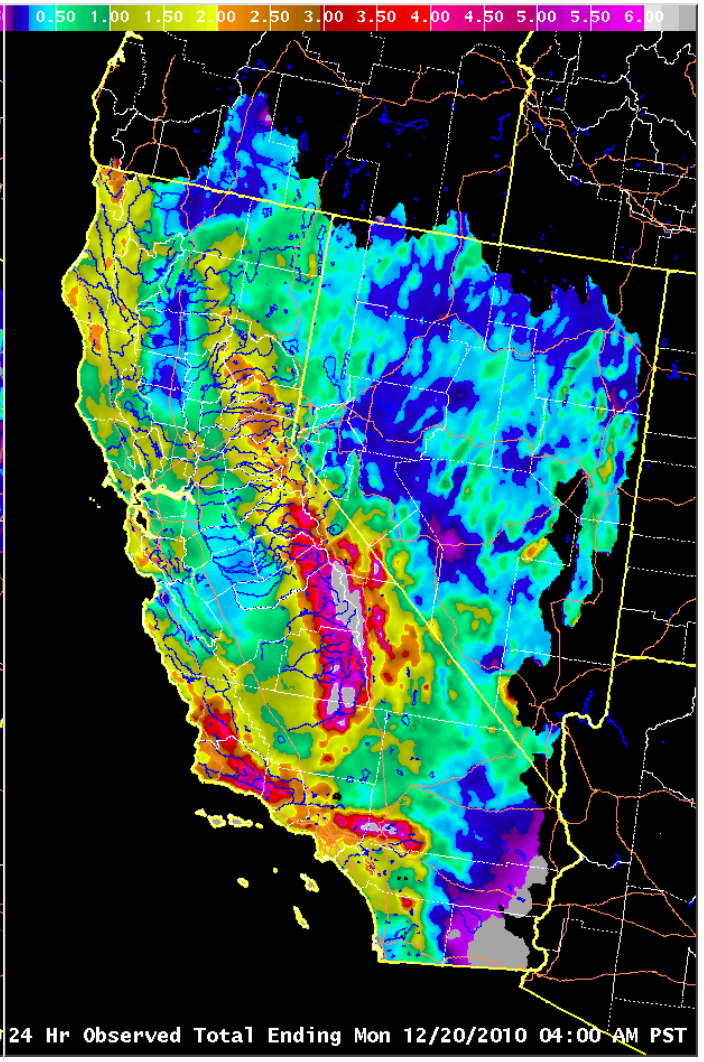
24 h ending 12 UTC 18 Dec



24 h ending 12 UTC 19 Dec



24 h ending 12 UTC 20 Dec



HMT + CDEC Precipitation Gauge Totals